National Aeronautics and Space Administration

NASA GODDARD

OPSPARC

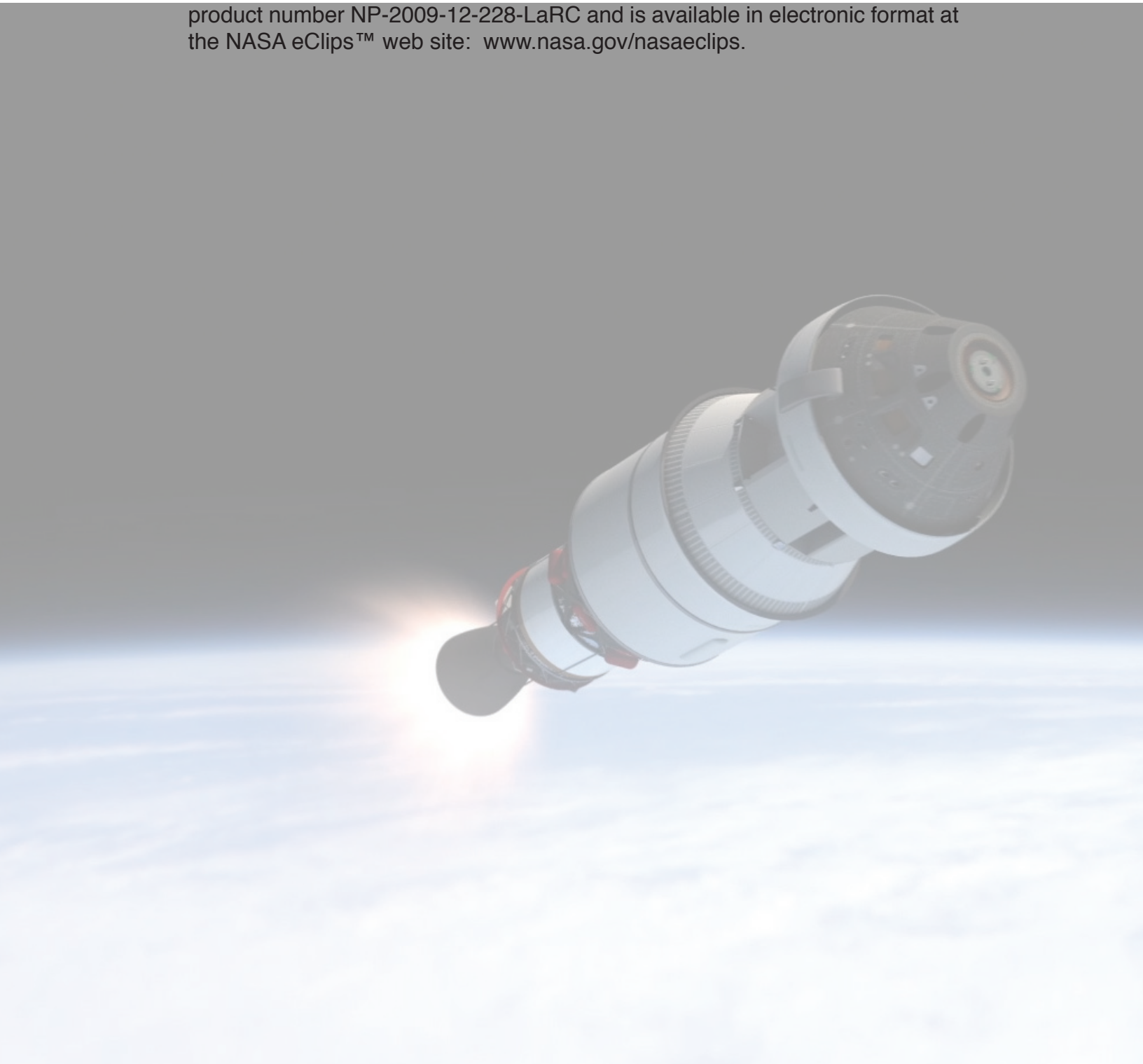
OPTIMUS PRIME SPINOFF PROMOTION & RESEARCH CHALLENGE

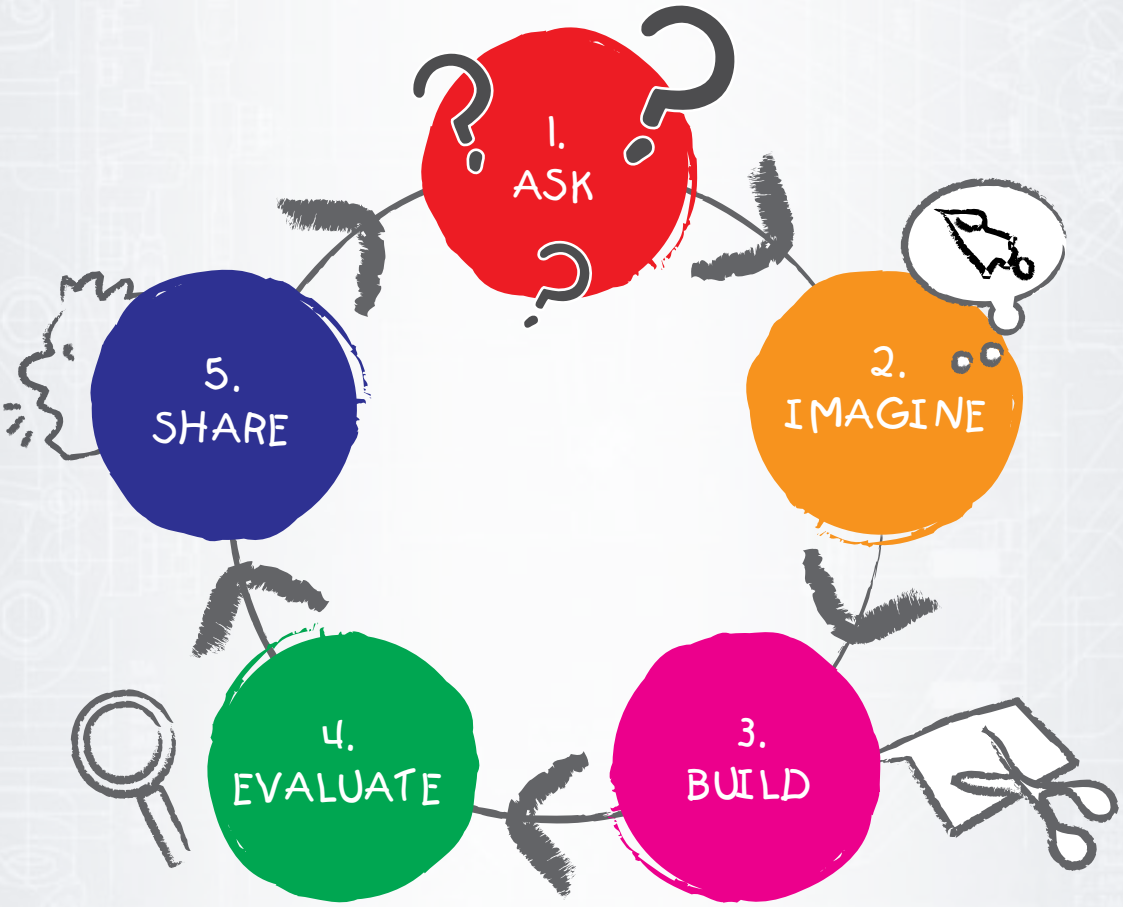
Grades 3–5

Design Packet

www.nasa.gov

The Elementary Design Packet was originally produced for NASA by the National Institute of Aerospace as part of the NASA eClips™ activity. The packet for Educators and Students, Grades K-5, was approved as educational product number NP-2009-12-228-LaRC and is available in electronic format at the NASA eClips™ web site: www.nasa.gov/nasaeclips.





Steps of the Design Process

1. ASK
- What is the problem?
- What have others done?
- What are the limits?

2. IMAGINE
- What are some solutions?
- Brainstorm ideas.
- Choose the best one.

3. BUILD
- Draw a diagram.
- Make lists of materials you will need.
- Follow your plan and build it.

4. EVALUATE
- Test it out!
- Record your results.
- Make changes to improve it.

5. SHARE
- Explain your ideas to others.

Step 1: Ask

A. What is the problem?

B. What have others done to solve this problem?

C. What are the limits? These may include such things as cost or time.

Step 2: Imagine

A. What are some solutions? Brainstorm ideas and list them.

B.Choose the best idea and explain why you think it is the best.

C. Brainstorm ideas for each part of the design chosen by your team. Be sure everyone can explain the choices.

Step 3: Build

A. Draw a diagram of your design.
On the drawing, label all parts clearly.

B. Make a list of the materials you will need.
Describe why you have chosen these materials.

C. Follow your plan and build the model.

D. How did your drawing help you build your model?
How would your drawings and notes help others?

E. If there are any differences between your drawing and your model, explain why you made these changes.

Step 4: Evaluate

A. Test your model. Describe the test you used.

B. Record your results.

C. Did your model do what was expected? Describe what you observed.

D. Did the materials you use work? What other materials might be better?

E. What changes would you make to improve your model? Why would you make each change? Are there any reasons you cannot make the changes you would like to make?

F. Make changes to improve your model. Go back and mark any changes you made on your original drawing.

Step 5: Share

A. Explain your ideas to others. You might:

- make a poster.
- give a speech.
- make a short video.
- make a video collage.
- write a letter to NASA convincing them to build your model.

Be sure to include sketches, pictures, data and graphs in your presentation.

B. Tell what each member of the team did for this project.

EXTEND (Optional):

A. Compare your design to others. How are the designs different? Is there some part of another design you would like to add to your design?

B. How could you test which model is best? Decide on a test and try it out.

Design Challenge Evaluation Rubric

Elementary School Design Packet

Group Members: _____

_____

Rubric Category	***Score***
Ask • The problem is clearly explained. • The work others have done to solve the problem is listed. • At least two limits are listed and explained.	
Imagine • Two or three ideas for solutions are listed. • One idea is chosen by the team and reasons for the choice are included. • Each part of the design can be explained and defended by the team.	
Build • A diagram of the model is made before the model is built. • The model is built based on the original design. • Reasons for design changes are given. • The materials list includes everything that will be needed to build the model. • Reasons for material choices are given.	
Evaluate • All questions in the student handout are completed. • Answers are correct and make sense. • The model is tested. • Results of the test are recorded neatly and accurately.	
Share • The presentation is well-organized. • Presentation includes sketches, pictures, data or graphs. • The work on the project is shared equally by members of the team. • Each member of the team contributes ideas and suggestions.	
TOTAL (out of 20 pts possible)	

4 (Excellent) = All directions (questions, steps and details) are met or followed.
3 (Good) = Most directions are met with only a few mistakes.
2 (Fair) = Many directions are not met and/or there are many mistakes.
1 (Poor) = Most directions are not met and there is missing information.
0 (No effort) = No effort to meet directions.